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AUTHOR Lederman, Norman G.; Gess-Newsome, Julie
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ABSTRACT

The microteaching course continues to be a focal point in the preservice training of science teachers. The purpose of this study was to qualitatively investigate the effects of a microteaching course on preservice science teachers' perceptions of teaching, instructional behaviors, decision making skills, and any changes in beliefs occurring throughout the duration of the course. A total of 17 preservice teachers were used as subjects. The subjects were required to present four lessons based on lecture/recitation, general inductive model, general deductive model, and a laboratory activity. After each presentation, each student received three types of feedback: informal verbal from peers; formal written from course instructor; and videotape. Students' self critiques and questionnaires were collected as data. The qualitative analysis of data yielded a total of 12 categories of concerns for self and students. The subjects viewed planning as a two component process: the physical act of writing a lesson plan, and the subsequent mental rehearsal of that plan. The study found a transition state of focus among the subjects from "concerns for self" to "concerns for students." Several implications for science teacher education were discussed. (YP)

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A Qualitative Analysis of the Effects of a Microteaching Course on Preservice Science Teachers' Instructional Decisions and Beliefs About Teaching

Norman G. Lederman
Department of Science and Mathematics Education
Oregon State University
Corvallis, Oregon 97331

Julie Gess-Newsome
Department of Science and Mathematics Education
Oregon State University
Corvallis, Oregon 97331

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A Qualitative Analysis of the Effects of a Microteaching Course on Preservice Science Teachers' Instructional Decisions and Beliefs About Teaching

Introduction

The science classroom is a dynamic environment with a multitude of instructional decisions confronting the teacher each moment. Research on "teacher thinking" has flourished widely during the past decade and has provided much insight into how teachers plan for instruction and upon what basis instructional decisions are made (Berliner & Rosenshine, 1987; Borko, Cone, Russo & Shavelson, 1979).

The "microteaching" course continues to be a focal point in the preservice training of science teachers (Yeany and Padilla, 1986). It is one of the few opportunities that the preservice teacher has to practice execution of instructional plans, develop instructional behaviors, view one's own teaching on videotape, and receive systematic feedback prior to the student teaching experience. Unfortunately, the effect of such a course on preservice teachers' thinking and decision making skills has not been systematically investigated.

Prior research on preservice teachers' planning and decision making has taken a quantitative approach (Evans and Tribble, 1986; Fuller 1969; George, 1978; Reeves and Kaslikis, 1985; among others) and has therefore assumed possible concerns and trends in preservice teachers' thinking a priori. Although Cronin (1988) claimed to pursue an investigation of student teacher beliefs,

and changes in such beliefs, from a qualitative perspective, in actuality the study involved a combination of qualitative data gathering techniques and quantitative operationalization of variables and analyses. Again, this study was partially victimized by *a priori* assumptions concerning preservice teacher's beliefs and attitudes. In addition, the focus of this study was upon student teachers.

Therefore, at present, there is yet to be any systematic investigation of preservice teachers' beliefs, attitudes and perceptions about teaching, or their decision making skills within the context of a microteaching course. Given the prominence of microteaching, or analogous instructional methods courses, within science teacher education programs, it is quite disconcerting that the effects of such courses remain an uncharted area. The purpose of this investigation was to qualitatively investigate (so as to avoid any unsubstantiated *a priori* assumptions) the effects of a microteaching course on preservice science/math teachers' perceptions of teaching, instructional behaviors, decision making skills, and any other changes which occur as a function of time throughout the duration of the course. It is believed that the results of this investigation will serve to reinforce the importance of microteaching courses to science teacher preparation and provide ways to improve science teacher education.

Design

Given the exploratory nature of this research, a qualitative approach was used for the collection of data. In particular, the case study design, as specified by Bogdan and Biklen (1986), was deemed to be most appropriate.

Subjects

All students enrolled in a microteaching course participated in this investigation. This group was composed of 15 males and two females. Eleven of these students were completing undergraduate degrees, while six were pursuing teacher certification at the graduate level.

Data Collection

Data was collected within the context of the aforementioned microteaching course. This course is taken at the completion of the teacher education program by all preservice science/math teachers at the university in which this research was conducted. Consequently, all subjects had previously completed a methods course and were scheduled to student teach within one of the following two academic quarters.

The specific structure of the microteaching course is significantly relevant to the interpretation of the research findings and will, therefore, be briefly discussed. All students enrolled were required to plan and present four lessons of 15-20

minutes in length. These lessons were presented to both peers and course instructors. Each lesson presented followed a different model/method of teaching. Specifically, the models/approaches were used in the following sequence: Lecture/recitation, General Inductive model (as described by Joyce & Weil, 1987), General Deductive model(as described by Joyce & Weil, 1987), and a Laboratory activity. These particular approaches were selected based upon their overall applicability to science/math instruction. It is important to note that each of these instructional models/approaches were demonstrated and discussed by the course instructors approximately one week before student presentations.

Each lesson was videotaped and students were required to view and self-critique his/her lessons. Students were required to discuss specific positive and negative aspects of their lessons and present a plan for improvement based upon these observations for subsequent lessons. Each student received a formal written critique (approximately three to four single-spaced typed pages) from the course instructor after submitting the self critique. This procedure was followed in order to prevent the instructor's feedback from biasing student self critiques. Immediately following each lesson presentation students received a 15 minute formal critique primarily from their peers with elaboration by the course instructor. Consequently, each student received three types of feedback

(i.e., informal verbal, formal written and videotape) following each of their lessons.

Since the primary purpose of this research was to investigate preservice science/math teachers attitudes towards teaching and instructional decision making, only students' self critiques were used for analyses from the aforementioned data sources (videotapes, verbal feedback, etc., are being used as data sources for a related investigation). It was however, essential to document each student's attitudes, perceptions, and decisions during the course of the investigation. This data was gathered through the use of a questionnaire which was filled out prior to the first presentation, and then following each of the four presentations. Therefore, a total of five questionnaires were completed by each of the subjects. Although completed at specified times, these questionnaires were not collected by the course instructors until after the assignment of course grades.

The questionnaires completed following each presentation were identical and consisted of the following six "open-ended" items:

1. What have you learned, thus far, which will be of significant help to your success in student teaching?
2. Are those items discussed in #1 what you had expected to learn in this course?

3. Have you learned any instructional techniques which you initially did not anticipate as being important teaching skills? Explain your answer.

4. How would you rate the relative value of the different types of feedback (i.e., verbal critique, written critique, viewing your lesson on video-tape) that you have been given during the course? Explain your answer.

5. What relationship, if any, exists between your ability to plan and the quality of your presentation?

6. Are there any additional comments you would like to make concerning the value or contents of this course?

The questionnaire completed prior to the the first presentation differed only with respect to item #1. For this questionnaire students were asked how they expected to benefit from the course, and to describe the teaching skills/ techniques they believed to be of most importance to the beginning teacher. The responses to this questionnaire served as a measure of students' incoming perceptions of teaching.

Data Analysis

The reader is reminded that this investigation was conducted following a purely qualitative research methodology. Hence, a detailed, systematic analysis of students' self critiques and questionnaire responses was performed by the investigators in an

attempt to derive any evident patterns in subjects' attitudes, thinking, perceptions and/or instructional decisions. The specific guidelines as presented by Bogdan and Taylor (1975) were strictly followed. Space restrictions only permit a discussion of the most salient features of the qualitative analyses.

An initial analysis of the questionnaires enabled one of the researchers to derive and operationally define 16 categories and/or trends of the preservice teachers' instructional concerns, attitudes, etc. Specific trends in subject's thinking were derived by comparing concerns identified at the beginning of the investigation versus those stressed at the end of the investigation. These 16 categories were validated by the second researcher's qualitative analysis of the same data set. The first researcher then qualitatively compared students' self critique comments with the derived categories in an effort to establish any discrepancies and/or congruence between these more open-ended data and that derived from the more structured questionnaires. This procedure validated the previously noted patterns, but also resulted in the further subdivision of the initial 16 categories. For example, the category of "Questioning" was now subdivided into the following: number and placement of questions, quality of questions (including yes/no questions), effective use of questions, name placement and the avoidance of call outs when asking questions, use of wait time, distribution of questions around the room, reactions to student answers in a positive manner, problems with responding to questions and/or

student involvement, and anticipating questions or student responses.

Both researchers worked together during a final analysis of the data in an effort to collapse/refine categories or trends as needed. On this fourth reading, it became obvious that many of the categories derived overlapped or were at opposite ends of the same continuum.

Consolidation of categories resulted in a final list of 12 areas of concerns which were grouped under two major headings (i.e., concerns for self, concerns for students). The "Concerns for Self" heading consisted of speech, physical appearance, the mechanics of audio-visual use, and the mechanics of lesson plan access. The "Concerns for Students" consisted of reactions to and cognizance of students, student involvement, instructional sequencing, concrete and relevant instruction, effective use of questioning, planning, effective use of audio-visual materials, and management. It is from these categories that our results and assertions are derived.

Results and Discussion

The qualitative analysis of data yielded a total of 12 categories of subjects' perceptions, concerns, etc., and elucidated several trends in preservice teachers' concerns over time. Operational definitions of the 12 previously mentioned categories (as well as illustrative quotations which led to the derivation of each) are presented below.

Concerns for Self (Teacher)

1. Physical Appearance and Expression: reference to physical appearance or mannerisms

   "As far as my classroom presence, I held my forearms too close to my body and made nervous finger movements, or folded my hands across my stomach."

2. Speech: reference to clarity, volume, rate, pacing, verbal tics, diction and pronunciation associated with verbal discourse

   "Another aspect of my presentation that wasn't so very appealing was my speech pattern. I said "O.K." and "ummmm" as a stall while I was speaking. I also would speak in a burst and sometimes garble the idea I was presenting."

3. Audio-visual Mechanics: comments concerning the mechanical aspects of audio-visual use

   "I fiddled with the overheads too much. They were disorganized and I lost time trying to use them."

4. Lesson Plan Access: the ease with which one can extract information from one's plans

   "I will staple my notes in order so they are easier to refer to, and if they are in ink I think they'll be

easier for me to read, considering the lighting and my bifocals."

Concerns for Students

5. Reactions to and Cognizance of Students: awareness/ reactions to student behavior

   "On completion of this lesson I have discovered how difficult it is to keep all the students on task in a hands-on activity. The teacher needs to be very organized to make the lesson go well."

6. Student Involvement: attention to student participation in the lesson

   "The most important (instructional technique), I think, that I have learned so far is the necessity to continually involve the students equally and often."

7. Instructional Sequencing: pertains to the interrelationships among lesson presentation; coherency of lesson

   "First, and most important in my view, I had a logical, step-by-step flow from one point in my lesson to the next. I tried to key on this in my presentation preparation. I felt that if I could remember where my

plan would go next, the little points and questions would follow easily."

8. Concrete and Relevant Instruction: stress is on making instruction meaningful to students

"I feel the use of the slinky to reinforce the concepts of the two waves presented was the best part of my lesson. By presenting the idea of wave types in the form of a slinky, I provided a concrete example of those types. Since, by and large, most students remember a concept better when it is given in concrete form, I felt this would be the best way to show waves."

9. Use of Questioning: focus on instructional purpose and effectiveness of questioning

"One of the major downfalls I exhibited was, I would ask a question. But before the student could get the answer out, I would cut him off, and I finish the answer. I need to allow the student to finish the answer."

10. Audio-visual Use: focus on student interaction with audio-visuals as opposed to mechanics of operation (see #3)

"I noticed that when I gave a definition, I didn't write it anywhere. I need to write definitions out, either on the chalkboard or on the overhead. I could have

outlined the material that I was going to present on the chalkboard also. This would have helped the students to see where we were going."

11. Management: focus on classroom control.

"My use of proximity as a management technique was also very nice. By moving very close to Lory and Greg and using one of their rods for an example, it caused their attention to be focused on me and not on whatever they were doing."

12. Instructional Planning: attention to pre-instructional concerns

"I think my transitions went smoother with this lesson, but I think, as well as writing a lesson plan, I need to physically walk through a few before I finish the lesson plan-- to smooth the transitions, not seem so choppy, etc."

Most of these categories, in and of themselves, do not present an unexpected picture of the preservice teachers' concerns and perceptions about teaching. Indeed, analogous concerns have previously been well documented among samples of student teachers, beginning teachers, and experienced teachers (Clark and Yinger, 1979; Cronin, 1988; Evans & Tribble, 1986; Fuller, 1969; George, 1978; Reeves & Kaselkis, 1985; among

others). However, it is significant that the perceptions of microteaching students toward the act of teaching can now be added to this literature base.

The results concerning preservice science/math teachers thinking about planning are quite intriguing. In addition to the previous quotations presented with the definition of "Instructional Planning", the following quotes are representative of our subjects' views on planning:

> "Rehearsal allows me to anticipate weaknesses in the lesson, visibility, timing, sequencing, review."
>
> "There is some correlation between planning and quality of presentation. There is a greater correlation between rehearsal and quality of presentation."
>
> "Planning the presentation is obviously very important. However, planning the presentation, writing a lesson plan, and practicing a presentation are not the same thing."

It is clear that these individuals view planning as a two component proposition (that is, the physical act of writing a lesson plan and the subsequent mental rehearsal of that plan). Perhaps, it could be argued that the two are distinct categories of behavior. In either case, it appears that prior researchers and/or teacher educators have overly simplified the pre-active phase of teaching. That is, with the exception of Morine-Dershimer's (1979) conceptualization of "lesson images,"

those concerned with teachers' planning behavior (Carnahan, 1980; Clark and Yinger, 1979; Taylor, 1970; Peterson, Marx & Clark, 1978; McLeod, 1981; Zahorik, 1975) have virtually ignored the rehearsal aspect of planning. Not only does this present research investigation indicate the existence of "rehearsal," but the above quotations appear to indicate that it is weighted equally (or perhaps stronger than) the act of writing a lesson plan.

Clearly, the most significant finding of this investigation relates to the apparent shift of focus among the subjects from "Concerns for Self" to "Concerns for Students." Again, the reader is reminded that such trends were derived through the systematic qualitative comparisons of preservice teachers' comments during the initial stages of the microteaching course with those comments made during the later portions of the course (i.e., documented attitudes and perceptions following the second, third and fourth presentations). On the surface, such findings are consistent with the quantitative results obtained by Cronin (1988), Fuller (1969), McLeod (1981), Evans and Tribble (1986), George (1978), Reeves and Kaselkis (1985). However, the qualitative approach used in this investigation allows a more detailed analysis of preservice teachers' concerns and, perhaps, leads one to question the veracity of the intuitively appealing conclusion concerning the developmental process of preservice teachers' concerns. The following representative comments should serve to support this point:

"I felt like I had a little trouble with incorrect responses than I should have. I "fumbled" (for lack of a better word) on a couple of occasions because a student's response wasn't what I expected."

"I've learned that things won't always go as planned, so you have to prepare for anything that might go wrong. You have to overplan."

"I've learned how important it is to try to anticipate students comments so you're not completely caught off guard and floundering."

"I felt my first presentation was well planned. As a result, the worst parts of the lesson were things that are hard to plan for (student questions, voice)."

"One significant thing I've learned thus far is that you cannot expect that the students will answer the way you want. The teacher needs to be ready to react to all kinds of circumstances."

Although in each of the above remarks, there is a focus upon students, it would be incorrect to conclude that the teacher has indeed shifted his/her focus of concern from self to student. In particular, it is clear that the focus upon students in the above quotations is related to how they can cause a teacher's presentation to "flounder," or how unanticipated questions can

upset the flow of the teacher's presentation. Rather than the focus being on student learning (as it should be), the focus is still an egocentric one with respect to the teacher's ability to execute his/her plan. It could be argued that the above preservice teachers are in a state of transition with respect to concerns. A more extreme view might be that the students are viewed as "adversaries" as opposed to "beneficiaries" within an instructional sequence. In either case, the point is that educational researchers may have been too quick to assume that a teacher has shifted his/her instructional focus from self to student.

Implications for Science Teacher Education

The findings concerning the two component phase of planning and/or the preactive phase of teaching appear to have significant ramifications for how attention is given to instructional planning in methods or other preservice courses. Presently, instructional planning is approached as a rather mechanical process. In short, students are instructed on how to write objectives and are then required to, with varying degrees of specificity, to describe how these objectives are to be achieved. Some feel that lesson plans should be so specific that whether something is written on the board or not should be noted. Others feel that a content outline with key transitional statements and questions is all that is needed. Regardless of the approach, the rehearsal aspect of planning is typically ignored. How to

"rehearse" an instructional plan appears to be a process and this should be reflected in how one teaches instructional planning. A start might be to "write" an instructional plan along with preservice teachers by specifying instructional approaches and then requiring students to reflect upon the possible implications and results of their instructional choices. The same process should occur at each phase of the writing of the lesson plan as well as at the completion of the plan. However, this approach, as well as any others, should be a focus of future research.

Whether a teacher has shifted his/her focus from self to students is perhaps one of the most significant issues in teacher education. A teacher whose primary focus is upon student learning is undoubtedly the ideal of all science teacher educators, and educators in general. This is a teacher who is willing to investigate new teaching approaches and/or vary old techniques if it will improve student learning. On the other hand, the teacher who has failed to make the transition from self to student is quite possibly the teacher who is unwilling to teach in ways differently than he/she was taught. In addition, this might be the same teacher who strongly advocates the use of extensive seat work on the grounds that it keeps students busy and out of trouble. Indeed, one might even speculate that, perhaps, one of the most significant (but ignored) hindrances to the adoption of inovative curriculum is the position of the teacher on the aforementioned developmental continuum. Consequently, it is essential that we take a closer look at

teachers' concerns for self versus students and investigate ways that we can foster the transition.

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